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U1S S1291

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GB 2293534 A EP 0091497 A1 US 4839183 A  
US 3940497 A

(58) Field of Search

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A2D DEF DRT DX2  
INT CL<sup>6</sup> A23B 4/07 4/10 , A23L 1/31 1/315 3/365 ,  
A23P 1/08  
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## (54) Abstract Title

Separating frozen blocks of food into portions

(57) In the field of storage and distribution of chilled or frozen meat products, there is a need for a product that retains its structural integrity until cooking commences. Thereafter, it is desirable for the product to break down into a number of smaller pieces.

The invention relates to a method of manufacturing a food product (10) comprising the steps of:  
applying a fatty material in fluid form to the surface of each of a plurality of pieces (11) of a food material;

placing the pieces (11) adjacent one another, so that each piece is substantially separated from a neighbouring piece by a layer 12 of the fatty material;

reducing the temperature of the resulting stratified body so that the fatty material bonds the pieces together; and

dividing the stratified body in a direction generally divergent from the layers of fatty material.

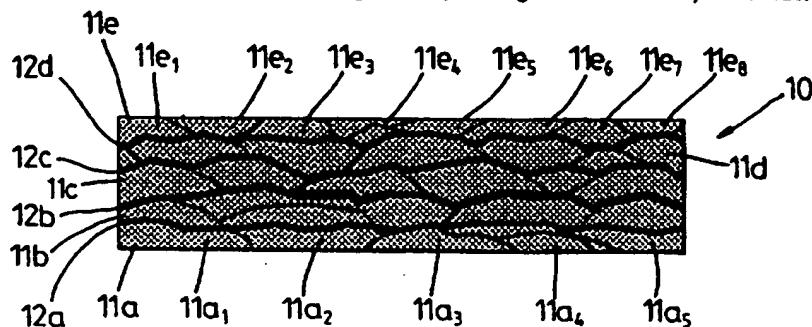
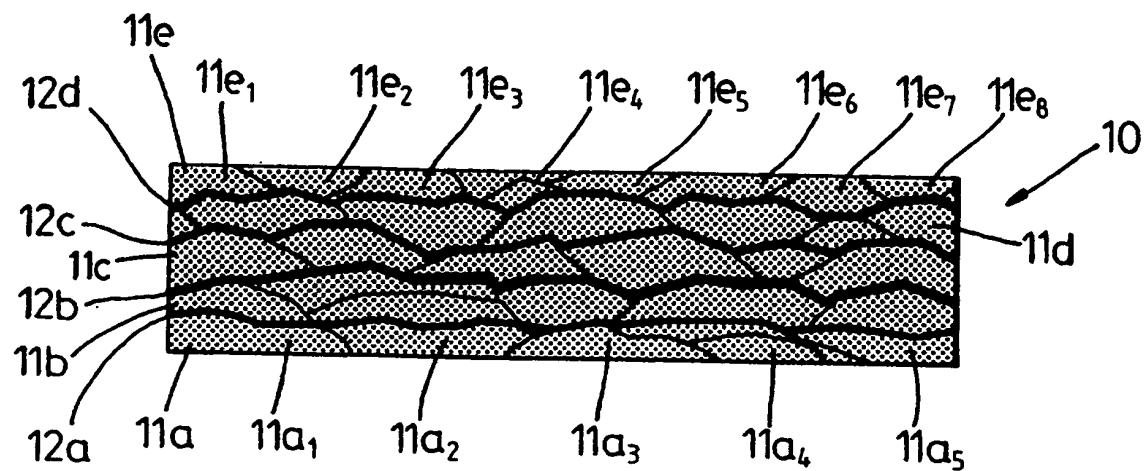


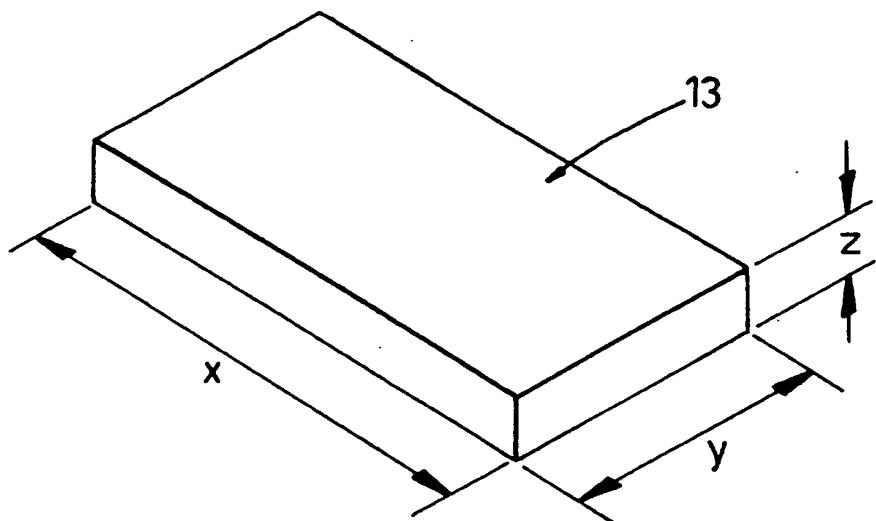
Fig. 1

GB 2 321 001 A

1/3

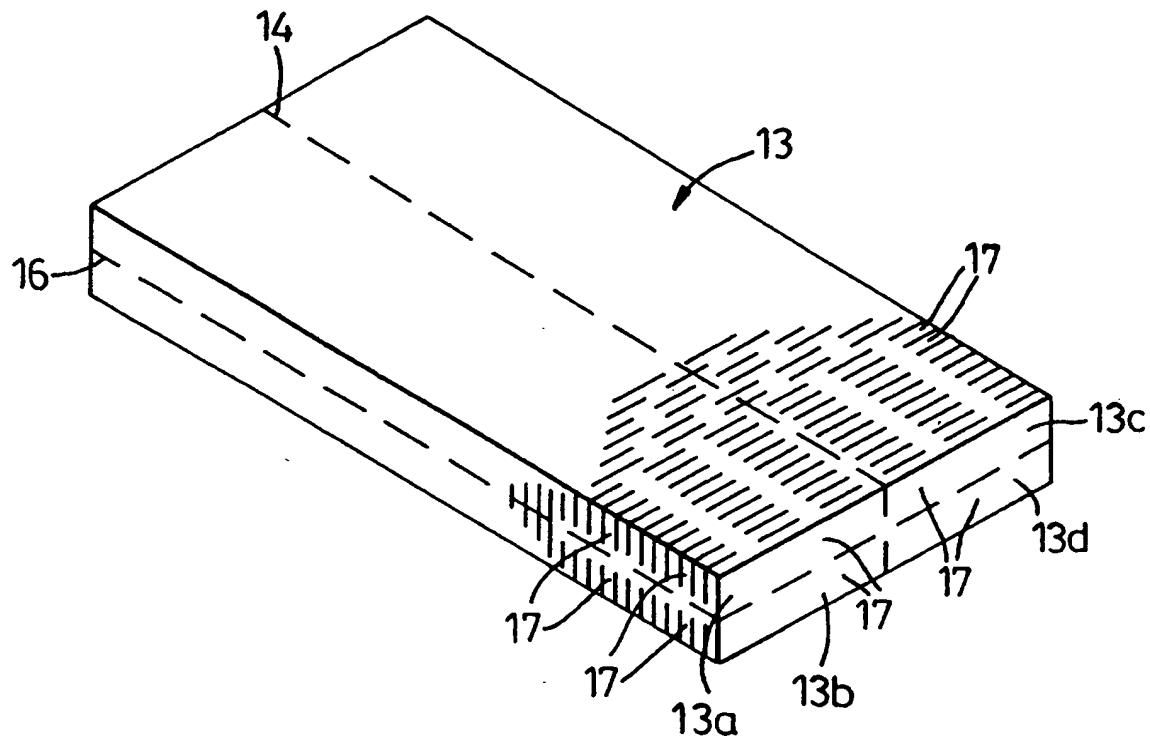


*Fig. 1*



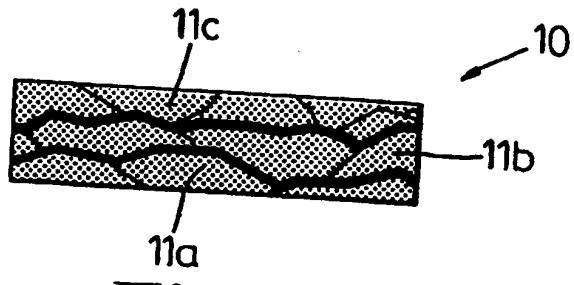
*Fig. 2*

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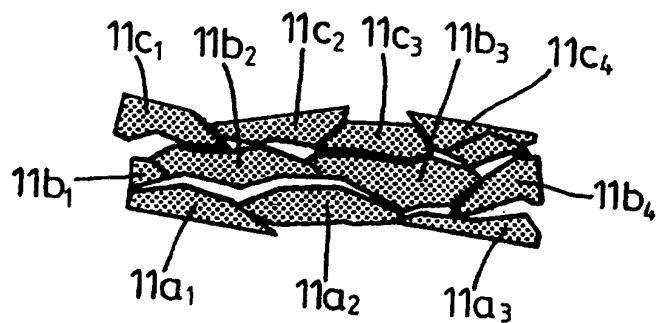


*Fig. 3*

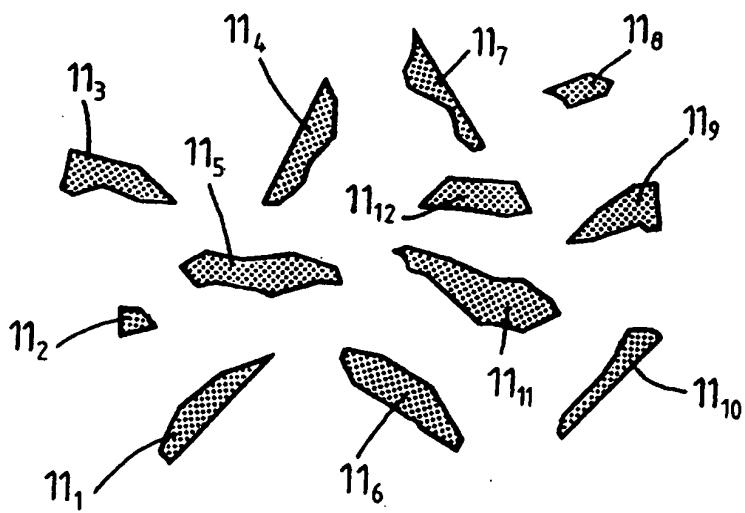
3/3



*Fig. 4*



*Fig. 5*



*Fig. 6*

IMPROVEMENTS IN OR RELATING TO FOOD PRODUCTS

This invention relates to improvements in or relating to food products. More particularly, the invention relates to a method of manufacturing a food product; a food product obtainable via the method; and a pack containing a plurality of such food products.

5 Manufacturers of foodstuffs supply frozen blocks of, eg. meats, fish, pasta, pastry and similar products. Such frozen blocks are intended for 10 use in restaurants and by caterers; for division into smaller units by some food retailers; or sometimes for home use, via frozen food retailers.

Frozen blocks of foods are associated with significant disadvantages.

15 In their frozen form, the blocks are extremely difficult and time-consuming to cut. On the other hand it is frequently wasteful and potentially unhygienic to thaw an entire frozen block in order to cut it into smaller pieces.

20 Moreover, cutting of the frozen blocks cannot be repeated with accuracy, so that the so-called "portion control" (ie. the uniformity of size of portions divided from the whole) associated with frozen blocks is poor. This disadvantage is particularly acute in the restaurant and catering industries, in which it is strongly desirable for successive portions of a 25 food product to be as uniform as possible.

Frozen blocks are particularly unsuitable for certain processes that involve the cooking of strips or other small pieces of food products such as meats. Examples of such processes include but are not limited to:

30 stir frying;

preparing fillings for eg. potatoes, sandwiches, taco shells and pitta breads; and

preparing toppings for pizzas, garlic breads and numerous other popular foods.

5

The manufacturers of the blocks generally aim to produce products that retain their structures during transportation, storage and cooking (or other processing). Such products, that are intended not to break into smaller pieces during cooking, are of limited utility in processes in which it is  
10 essential to divide the food product into a large number of comparatively small pieces. Moreover, the cooking times of food products cut from blocks can be undesirably long since the resistance to breaking down of frozen blocks means that cooking heat does not penetrate rapidly into the pieces.

15

Furthermore the frozen blocks are often unsuitable for use in the food service industry, in which prepared portions of meals (or prepared subcomponents thereof) are supplied in a stabilised form to eg. airlines, railway companies, ferry companies, public houses, restaurants, schools,  
20 colleges and fast food outlets. In such markets it is often extremely important for the prepared portions to exhibit good portion control.

Thus there is a need for a food product that is:

convenient to transport, store and use;  
25 easily converted into a plurality of smaller pieces;  
capable of being cooked rapidly and in a predetermined time; and  
capable of being produced in economically large quantities.

According to a first aspect of the invention, there is provided a method of  
30 manufacturing a food product, comprising the steps of:

(i) applying a fatty material in fluid form to the surface of each of a plurality of pieces of a food material;

5 (ii) placing the pieces one adjacent another, so that each piece is substantially or entirely separated from a neighbouring said piece by a layer of said fatty material;

(iii) reducing the temperature of the resulting stratified body so that the fatty material bonds the pieces one to another;

10 (iv) dividing the stratified body in a direction generally divergent from the layers of fatty material, whereby to form a plurality of further, stratified pieces of food material.

This method advantageously provides a food product that may be stored and transported in bulk, yet which breaks down rapidly (indeed almost instantaneously under the majority of circumstances) into a plurality of 15 smaller pieces when heated eg. during cooking. The resulting product also cooks rapidly once the pieces separate one from another.

The use of a fatty material to bond the strata together advantageously avoids the tendency of proteins in many food products such as meats and 20 fish to weld the pieces together in such a way that they do not readily separate one from another on heating of the food product.

25 Optionally the method includes the sub-step of adjusting as necessary the thickness of the pieces so that each piece is of a generally uniform thickness.

30 Preferably the step (iii) of reducing the temperature of the stratified body includes freezing, particularly instant quick freezing (IQF), of the food material. Thus the method advantageously may result in food products that are ready for storage and/or transportation. The temperature

reduction may optionally be carried out as a series of steps.

There are numerous *per se* known apparatuses and methods suitable for chilling and/or freezing food products according to the invention.

5    Particularly preferred embodiments of such processes and methods are those which reduce the temperature of the food product to the range 10°C to -25°C, and more preferably 0°C to -20°C.

It is important for the temperature of the stratified body to be sufficiently  
10 low (e.g. in the range 0°C to 2°C) for the fatty material to at least partially bond the pieces of food material together on application of the fatty material to the food pieces. Thus it may be necessary to pre-chill the food product, before application of the fatty material, depending on the ambient temperature of the food pieces. Freezing of the food product may  
15 then be achieved as a separate sub-step. In other words the order of the steps of the inventive method may be varied as necessary to suit the initial temperature of the food material.

Usually the application of the fatty material results in its solidification  
20 from a liquid form. Such solidification preferably occurs on contact of liquid fatty material with the cooled food pieces.

Once in a bonded form, the stratified body may be processed further. A desirable precursor to further processing of the stratified body involves  
25 placing it in a non-stick (e.g. waxed or polymer lined) container.

Conveniently the method includes the sub-step of pressing adjacent pieces of the food material together whereby to obtain a generally uniform density of food material in the stratified body. Preferably this sub-step  
30 takes place after formation of the stratified body. These features

advantageously eliminate gas pockets from between the strata, and also assist in ensuring good portion control.

In particularly preferred embodiments the stratified body experiences a

5 pressure of 3.5 kg/cm<sup>2</sup> (50lbs/in<sup>2</sup>) during pressing.

Preferably the method includes the sub-step of marinading the food material in the fatty material. This may conveniently be achieved during tumbling of the food material.

10

The method may also optionally include the sub-step of spraying fatty material in fluid form onto one or more of the pieces of food material, eg. after placing them in the stratified body.

15 The method may also optionally include the sub-step of trimming the pieces of food material to a predetermined size. This step preferably occurs before placing of the pieces in the stratified body.

Conveniently the division of the stratified body occurs in a direction generally perpendicular to the layers of fatty material. This is believed to be the most economical way of dividing the stratified body, but the division may occur in other directions if desired.

20

25 Preferably each further, stratified piece of food material is a stratified slice of greater length and breadth than thickness. Thus the resulting food product is convenient to handle and cook.

The method may also include the further step of packing a plurality of the stratified slices together, eg. in a box, bag or other package. The method

30 preferably includes the sub-step of isolating each slice from its

neighbouring slices in the package, whereby advantageously to prevent coherence of adjacent slices.

Preferred food materials for use in the method of the invention include,

5 but are not limited to:

poultry meat such as chicken or turkey meat;

"red" meat such as beef, lamb and pork;

proteinaceous fish meat such as salmon;

game and fowl;

10 pasta;

rice; and

pastry.

15 Optionally the method may include the sub-step of placing alternate layers  
of differing food materials in the stratified body.

Conveniently the method may include the further step of trimming the  
further, stratified pieces of food material after they are formed.

20 Preferred fatty materials for use in the method of the invention include,  
but are not limited to:

sunflower oil;

cotton seed oil;

soya oil; and

25 rape seed oil.

Combinations of such materials with one another, and/or with one or more  
additional ingredients, may be used if desired. Suitable additional  
ingredients include flavourings, salt and water. It is believed not to affect

30 the success of the method that the fatty material may form an emulsion

with the additional ingredient(s). Thus the method of the invention may result in layers of flavoured sauces or dressings, such as Cordon Bleu (cheese and ham) sauces; barbecue sauces; Kiev (garlic butter) sauces; and sauces used in stir fry or oven bake recipes, between the strata of food material. Numerous other sauces may also be used.

5 The invention is considered to reside in a food product obtainable by a method as defined herinabove.

10 According to a second aspect of the invention, there is provided a food product comprising a stratified piece of food material, the strata of the said piece being spaced from and bonded one to another by a fatty material that, on heating thereof, permits separation of the strata one from another.

15

The advantages of such a product are summarised above.

20 Preferably the strata of the food product are frozen, whereby advantageously to permit storage, transportation and handling of the product.

Conveniently the strata comprise one or more of:

25 poultry meat such as chicken or turkey meat;  
"red" meat such as beef, lamb and pork;  
proteinaceous fish meat such as salmon;  
game and fowl;  
pasta;  
rice; and  
pastry.

30

Conveniently the fatty material comprises one or more of:

- sunflower oil;
- cotton seed oil;
- soya oil; and
- 5 rape seed oil

in solid form.

10 The fatty material may optionally include one or more flavouring materials.

Preferably the food product is constituted as a stratified slice of greater length and breadth than thickness.

15 According to a third aspect of the invention, there is provided a pack containing a plurality of food products each as defined hereinabove and isolated one from another, preferably by means of a barrier.

20 There now follows a description of a preferred embodiment of the invention, by way of example, with reference being made to the accompanying drawings, in which:

Figure 1 is an elevational view of a preferred form of food product according to the invention;

25 Figure 2 is a perspective, outline view of a typical, stratified block according to the invention;

Figure 3 shows preferred lines of division of the block of Figure 2 to form slices as shown in Figure 1; and

Figures 4 to 6 are views of the slice of Figure 1 at the beginning, middle and end respectively of a cooking process.

In the drawings the shading of pieces of food product indicate the presence of marinade dispersed over or throughout the product.

Referring to the drawings, there is shown a stratified slice 10 of a food material. The strata 11a, 11b, 11c, 11d, 11e shown in Figure 1 may be all of the same food material, such as those defined hereinabove. Alternatively, the food materials of the strata may differ one from another. For example, the strata 11a, 11c and 11e of Figure 1 may be chicken meat, and the strata 11b and 11d may pork. Numerous combinations of food materials are possible.

Each stratum 11a - 11e of Figure 1 comprises a plurality of pieces 11a<sub>1</sub>, 11a<sub>2</sub>, 11a<sub>3</sub>, 11b<sub>1</sub>, 11b<sub>2</sub>, etc., of food material. In the embodiment shown the pieces are elongate strips, but other shapes of the pieces making up the strata are possible.

The stratified slice of Figure 1 is shown in its pre-cooked condition. In this condition, each stratum 11a - 11e is bonded to and separated from any neighbouring strata by a layer 12a, 12b, 12c, 12d of fatty, edible material.

20

The layers 12 are shown in bold lines in the figures for clarity, but may appear in preferred embodiments as a white or milky "marbling" of the slice 10.

25 The layers 12 may be formed entirely or primarily of one or more oils such as sunflower oil, cotton seed oil, rape seed oil, soya oil, and other natural, non - animal oils. Fatty material derived from animal products may possibly be used, but is thought to be less satisfactory than the vegetable oils mentioned above.

30

The layers 12 may include water, salt, flavourings and/or other food components, so that the nature of each layer is that of a marinade, or even a flavoured sauce. Such possibilities enhance the flavour of the food product when cooked and permit manufacture of many variants of the slice

5      10. In this regard the fatty material may form an emulsion with the other food components, or may admix fully therewith. Either form of resulting layer 12 is thought to provide a food product of acceptable quality.

When one or more of the layers 12 is constituted as a sauce, typical sauce  
10      styles may include Cordon Bleu (cheese and ham); barbecue; Kiev (garlic butter); and sauces used in stir fry and oven bake recipes.

In any event, a characteristic of the fatty material constituting each layer  
15      12 is that it readily converts from its solid form, illustrated schematically by the bold lines in Figure 1, to a liquid (or other fluid) form on heating of the slice 10, eg. during cooking thereof. In its solid form the fatty material bonds the strata 11 one to another. The resulting bonds break down when the fatty material converts to liquid form.

20      In its solid form the fatty material also spaces or isolates the strata 11 one from another so that permanent or semi-permanent welding of the strata together, by virtue of protein in the material(s) of the strata, is avoided. Thus bonding of the strata of Figure 1 together occurs by virtue of characteristics of the solid, fatty material.

25

It is expected that the slice 10 will be provided frozen, thereby ensuring that the layers 12 remain solid during storage and transportation, until heating of the slice 10. It is expected that such processes most commonly will involve cooking of the food product. An example of a typical  
30      cooking process is described below with reference to Figures 4 to 6.

Figure 4 shows the start of cooking, which typically may take place in or on a utensil such as a frying pan, griddle or wok. The slice 10 is shown very shortly after placing in such an utensil, ie. while the fatty material is still in its solid form and therefore bonding the strata 11 together.

5

Figure 5 shows the slice 10 a short time later. The cooking heat penetrates rapidly into the layers 11, thereby causing the fatty material to assume a liquid form and permit separation of the food pieces 11<sub>a1</sub>, 11<sub>a2</sub>, 11<sub>b1</sub>, 11<sub>b2</sub>, etc. Depending on the choice of fatty material 12, this effect 10 may be achieved perhaps within one minute of the start of cooking, or even virtually instantaneously.

Once the pieces have separated one from another, the remainder of the cooking time is spent in achieving the requisite degree of cooking for the 15 recipe under consideration. Since the pieces are of small size compared with the slice 10, the cooking heat penetrates rapidly into the food material, thereby providing short cooking times for products according to the invention. Also, the fatty material is a good heat conductor and assists this effect. Since (as described below) the product of the invention 20 exhibits excellent portion control, the cooking time for a given recipe may be accurately predicted.

Figure 6 shows the appearance of the pieces at the end of the cooking process. Since the pieces are at this stage entirely separated one from 25 another, and are no longer in recognisable strata, they are labelled 11<sub>1</sub>, 11<sub>2</sub>, 11<sub>3</sub>, etc. in Figure 6.

A variant of the process described with reference to Figures 4 to 6 may involve simply heating a slice 10 sufficiently to melt the fatty material and 30 separate the pieces 11 one from another, without immediately completing

cooking of the pieces. Such a method may be suitable when the pieces are intended to undergo a different form of cooking, in a separate environment, after separation. An example of this is the cooking of a pizza, in which pieces of a topping may be supplied in the form of a slice

5      10, the pieces 11 then being separated by heating as described, applied as a topping to a pizza base and subsequently baked in an oven separate from the utensil in which the separation occurred. Thus the product of the invention may provide pizza topping ingredients, in a pre-cut, frozen form (ie. slice 10), that may rapidly and conveniently be made available for

10      use. Similarly obtained pieces of food products could conveniently be used as sandwich fillings. In such cases the cooking step subsequent to separation of the pieces may of course be dispensed with, as necessary.

A method of forming food products according to the invention comprises

15      firstly selecting and quality checking fillets of meat. If necessary the fillets may be trimmed to a preferred size for subsequent processing. Also, depending on the fatty material used and the initial temperature of the fillets, it may be desirable to pre-chill the fillets (typically to 0°C to 2°C), to ensure that the fatty material performs its bonding function as

20      described below.

The fillets are then marinated, eg. by tumbling in a fatty material such as a sauce as described above, until the exterior of each fillet is fully coated with the said material.

25

Thereafter the fillets are subjected to a thickness standardisation process, whereby the thickness of each fillet is made substantially the same. The thickness adjustment can be carried out using a Schnitzel press, a *per se* known apparatus comprising two roughened belts spaced vertically one

30      above the other. The spacing of the belts is less than the thickness of the

fillets. The belts are driven by a motor so that fillets fed into the press are "ironed" to a thickness equivalent to the spacing of the belts.

The fillets are then lain one above as a first step in the formation of the  
5 stratified block referred to above. Neighbouring fillets are separated one from another by respective layers of the marinade. Optionally, further fatty material such as oil, marinade or a sauce may be applied to the fillets during layering, for example by spraying or dropping liquid sauce onto the fillets after they have been placed. If desired such spraying/dropping can  
10 be applied for instance to every third layer.

If the fillets are at this stage already at a sufficiently low temperature to permit the fatty material to perform its bonding function, of course the  
15 step of spraying or dropping of the fatty material becomes very important in forming of a stratified block the pieces of which are at least partially bonded together.

The part-formed, stratified block is then moulded under pressure to form a block 13 as shown in Figure 2. Typical dimensions x, y and z of block  
20 13 are:

$$x = 485 \text{ mm};$$

$$y = 255 \text{ mm}; \text{ and}$$

$$z = 60 \text{ mm},$$

although of course virtually any dimensions are possible.

25 A typical moulding pressure is  $3.5 \text{ kg/cm}^2$  ( $50 \text{ lbs/in}^2$ ). The pressing of the block 13 eliminates air (or other gas) bubbles from between the strata 12; and, more importantly, ensures that the density of the block 12 is substantially uniform throughout. This in turn confers significant  
30 advantages in terms of portion control.

The temperature of block 13 is then reduced. If the temperature of the food product is already low enough to have caused bonding of the pieces together, the block is simply frozen (e.g. to -20°C) for storage and/or distribution. In a more complex form of the method (in which the

5      temperature of the food pieces at this stage is not low enough to cause bonding) the block 13 is initially chilled sufficiently to solidify the fatty material in layers 12, and then frozen, if necessary in a separate step. IQF techniques may be employed to achieve the desired chilling.

10     The block 13 is then divided into a plurality of servings or portions and packed for distribution and use.

One way of dividing the block 13 is shown schematically in Figure 3. The block 13 is initially divided into four parts 13a - 13d, on mutually orthogonal planes 14 and 16 extending longitudinally along the block. The parts 13a - 13d are then temporarily held together as shown in Figure 3, and sliced along the phantom lines to generate a large number of stratified slices 17 each of equal size, weight and density. The phantom lines shown are generally perpendicular to the layers 12 of fatty material, but could be at other angles thereto. A typical slice thickness may be 20 mm. By altering the positions of the cutting planes shown in Figure 3 the weight of the slices may be controlled.

25     The slices 17 are then packed, eg. by placing barriers between adjacent slices 17 in a package. The barriers may be eg. greaseproof paper, that prevents welding of the frozen slices together during storage. Alternatively the slices 17 may be placed in a package that isolates them one from another eg. by means of air gaps or so-called "flow wrapping", as used in the confectionery industry.

Each slice 17 is thus a controlled portion of a food product that is deep frozen yet conveniently presented for easy use; that contains the same quantity of food material as all other such slices in a pack; that readily breaks down into a plurality of pieces 11<sub>1</sub>, 11<sub>2</sub>, 11<sub>3</sub>, etc. on 5 heating/cooking; and that is quick to cook. In the embodiment shown and described the pieces 11 are strips of food material, but of course other shapes are possible depending on the manner in which the block 13 is divided and the trimming and pressing of the fillets.

## CLAIMS

1. A method of manufacturing a food product, comprising the steps of:
  - 5 (i) applying a fatty material in fluid form to the surface of each of a plurality of pieces of a food material;
  - (ii) placing the pieces one adjacent another, so that each piece is substantially or entirely separated from a neighbouring said piece by a layer of said fatty material;
- 10 (iii) reducing the temperature of the resulting stratified body so that the fatty material bonds the pieces one to another;
- (iv) dividing the stratified body in a direction generally divergent from the layers of fatty material, whereby to form a plurality of further, stratified pieces of food material.
- 15
2. A method according to Claim 1 wherein the step (iv) of reducing the temperature of the stratified body includes freezing the food material.
3. A method according to Claim 2 wherein the freezing comprises  
20 instant quick freezing (IQF) of the stratified body.
4. A method according to any preceding claim wherein the temperature of the stratified body is reduced to 10°C to -25°C, especially -20°C.
- 25
5. A method according to any preceding claim including the sub-step of pressing adjacent pieces of the food material together whereby to obtain a generally uniform density of food material in the stratified body.
- 30 6. A method according to Claim 5 wherein the sub-step of pressing

adjacent pieces of the food material takes place after formation of the stratified body.

7. A method according to Claim 6 wherein the stratified body is  
5 subjected to a pressure of  $3.5 \text{ kg/cm}^2$  ( $50 \text{ lb in}^{-2}$ ).
8. A method according to any preceding claim including the sub-step  
of marinading the food material in the fatty material in fluid form.
- 10 9. A method according to Claim 8 including the sub-step of tumbling  
the food material in a marinade comprising a fatty material in fluid form.
- 15 10. A method according to any preceding claim including the sub-step  
of spraying fatty material in fluid form onto one or more of the pieces of  
food material.
11. A method according to any preceding claim including the sub-step  
of trimming each of the pieces of food material to a predetermined size.
- 20 12. A method according to any preceding claim wherein the stratified  
body is divided in a direction generally perpendicular to the layers of fatty  
material.
- 25 13. A method according to any preceding claim wherein each further,  
stratified piece of food material is a stratified slice of greater length and  
breadth than thickness.
14. A method according to Claim 13 including the further step of  
packing a plurality of the stratified slices together.

15. A method according to Claim 14 wherein each stratified slice is isolated from any neighbouring stratified slices during said packing.

16. A method according to any preceding claim wherein the food material comprises one or more of:

10 poultry meat;

“red” meat;

proteinaceous fish meat;

pasta;

rice;

pastry;

game or fowl meat.

17. A method according to any preceding claim wherein alternate layers of food material in the stratified body comprise differing food materials.

18. A method according to any preceding claim including the further step of trimming the further, stratified pieces of food material after formation.

20

19. A method according to any preceding claim wherein the fatty material in fluid form comprises one or more of:

sunflower oil;

cotton seed oil;

25 soya oil;

rape seed oil.

20. A method according to any preceding claim including the step of adjusting as necessary the thickness of the pieces so that each piece is of 30 a generally uniform thickness.

21. A method according to any preceding claim including the step of chilling the food product to a temperature causing solidification of fatty material from liquid form on contact with the food product.

5 22. A food product obtainable by a method according to any of Claims 1 to 21.

10 23. A food product comprising a stratified piece of food material, the strata of the said piece being spaced from and bonded one to another by a fatty material that, on heating thereof, permits separation of the strata one from another.

15 24. A food product according to Claim 23 wherein the strata are frozen.

25. A food product according to Claim 23 or Claim 24 wherein the strata comprise:

poultry meat;

“red” meat;

20 proteinaceous fish meat;

pasta;

rice;

pastry;

game or fowl meat.

25 26. A food product according to any of Claims 23 to 25 wherein the fatty material comprises one or more of:

sunflower oil;

cotton seed oil;

30 soya oil;

rape seed oil  
in solid form.

27. A food product according to Claim 26 wherein the fatty material  
5 includes a flavouring material.
28. A food product according to any of Claims 23 to 27 constituted as  
a stratified slice of greater length and breadth than thickness.
- 10 29. A pack containing a plurality of food products each according to  
any of Claims 23 to 28 isolated one from another.
30. A pack according to Claim 29 wherein each food product is isolated  
from a neighbouring said food product by a barrier.  
15
31. A method generally as herein described, with reference to or as  
illustrated in the accompanying drawings.
- 20 32. A food product generally as herein described, with reference to or  
as illustrated in the accompanying drawings.
33. A pack generally as herein described.



The  
Patent  
Office

21

Application No: GB 9700489.9  
Claims searched: 1-33

Examiner: Keith Kennett  
Date of search: 3 April 1997

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK Cl (Ed.O): A2B ( BKX, BMM4, BMM9, BMM29 ); A2D ( DEF, DRT, DX2 )  
Int Cl (Ed.6): A23B 4/07, 4/10; A23L 1/31, 1/315, 3/365; A23P 1/08  
Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2293534 A ( PADLEY ) see page 1 line 17	23
A	EP 0091497 A1 ( FRISCO ) see Example 1	23
A	US 4839183 ( PERRINE ) see claim 1	23
A	US 3940497 ( ARENSON ) see claim 1	23

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.  
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A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
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